ISSN No:-2456-2165

Organic Waste Powdering Unit

Fakrudheen Bava[1], Advaith Krishna VP[2], Jasir Ahammed PC[3], Akshai Bhaskar[4], Anandhu Radhakrishanan AV[5]
[1] Faculty of Mechanical Engineering, Eranad Knowledge City Technical Campus, Manjeri, Malappuram, Kerala, India
[2,3,4,5] Students of Mechanical Engineering (2017-2021 batch), Eranad Knowledge City Technical Campus, Manjeri, Malappuram, Kerala, India

Abstract:- This paper titled "Organic Waste Powdering Unit". Organic waste is a natural material having high nutritive qualities and high calorific value. Huge amounts of biodegradable waste are created every year. This waste causes infections or gets into water supplies and will affect human health. For a healthy environment, the wastes should be properly disposed of. To reduce food waste volume, emissions, and odor the indoor electric composter uses aeration, heat, and pulverization. After fermentation, due to the lack of green and economic methods, the recovery of target products is a key problem. This machine is used to convert the bulk food waste into powdered fertilizer within a short period compared to other processes.

Keywords:- *Food Waste, Shredder, Fermentation Chamber.*

I. INTRODUCTION

Today food waste is becoming a major issue in the environment. So, food waste should be utilized or treated in an effective method to reduce pollution. The aim of this project is to reduce the negative impact of organic waste on the environment, society, and public health. For arranging the biodegradable waste, a waste disposal unit can be used. The organic powdering unit can be used at a municipal level it will help the farmers by providing organic compost to various other farmers in that municipal area. Due to poverty think of taking a drastic and senseless decision of committing suicide as they are poor and are not self sufficient to make their own organic fertilizer and neither are able to buy chemical fertilizers to increase and meet their minimum crop yield demand, thereby providing a helping hand to farmers to meet their never-ending demand of fertilizer. Organic powdering unit is a unit which converts the biodegradable waste into powdered fertilizer.

II. OBJECTIVE

- Minimizing food waste disposal.
- Reduce complexity of handling organic waste.
- Speed up the bacterial action.

III. LITERATURE REVIEW

1. *Design of portable waste shredder machine for domestic compost, Rahul Thakur, Aman Sharma, Jyoti, R. P. Singh.*

0.37 million tons of organic waste are produced every year in India. The landfilling of the food waste produces methane gas. Methane gas is an ozone harmful substance. It is multiple times riskier than carbon Dioxide. Food waste decomposition leads to the production of poisonous gases which cause depletion of the ozone layer and causes atmospheric climatic change.

2. *Transformation of biomass waste into sustainable organic fertilizers Kit Wayne Chew, Shir Reen Chia, Hong-Wei Yen, Saifuddin Nomanbhay, Yeek-Chia Hoand Pau Loke Show.*

Depending upon the types of waste used the chemical composition of organic fertilizer can be evaluated. Here the advantage of substituting chemical fertilizer for organic fertilizer is derived from food waste.

3. *Conversion of food waste to fermentation products Muhammad Waqas, Mohammad Rehan, Muhammad Daud Khan, and Abdul-Sattar Nizami.*

Many environmental and health problems are faced due to the massive landfilling of food waste. Kitchen waste is an economical high amount of calorific value and nutrient qualities that can be converted into many other useful products. Many operations are taking place in order to convert food waste into fermented products.

4. *Food waste to energy: an overview of sustainable approaches for food waste management and nutrient recycling, Kunwar Paritosh, Sandeep K. Kushwaha, Monika Yadav, Nidhi Pareek, Aakash Chawade, and Vivekanand.*

Organic and food waste landfilling is a major issue in the world due to the increase in population. The increase of food waste leads to a threat to us by environmental pollution and health problems. To overcome this issue, appropriate methods should be adopted. A promising method for nutrient and energy production is utilizing anaerobic digestion. Here the main description is about microbial action in the case of the waste management system of food waste.

IV. MAIN COMPONENTS

The main components are as follows:

- Feeder
- Shredder
- Mixing chamber
- Fermentation chamber
- Collecting tray

A. Feeder

The feeder is the topmost portion of the organic waste powdering unit where the waste is dumped. It feeds the organic waste to the shredder. A covering is provided above the feeder for foolproofing.

B. Shredder

The shredder is combined with the shaft, gear blades, and blade spacer. The food waste is shredded with the help of rotating gear blades. The shredder blades are assembled in the shredder housing with the help of deep groove ball bearings. The blade fingers are provided for proper feeding of food waste into the gear blades. It prevents the waste from falling through the sides of the shredder house.

C. Mixing chamber

It is a cylindrical chamber that is placed horizontally under the shredder assembly. Here the food waste is mixed using a double helical ribbon (DHR) agitator. The water from the waste is drained using a drainer under this chamber. Heating is also provided by a heating coil surrounded through the mixing chamber.

D. Fermentation Chamber

It is a cylindrical chamber that is placed horizontally under the mixing chamber. A stirrer blade is used in this chamber to speed up the fermentation process. Stainless steel is used for the chamber, cylinder, and blades. It is the last processing unit where the output is produced.

E. Collecting Tray

The final powdered fertilizer is collected in this tray. This tray is placed under the fermentation chamber. The tray can be slide to collect the organic fertilizer and it is made up of plastic.

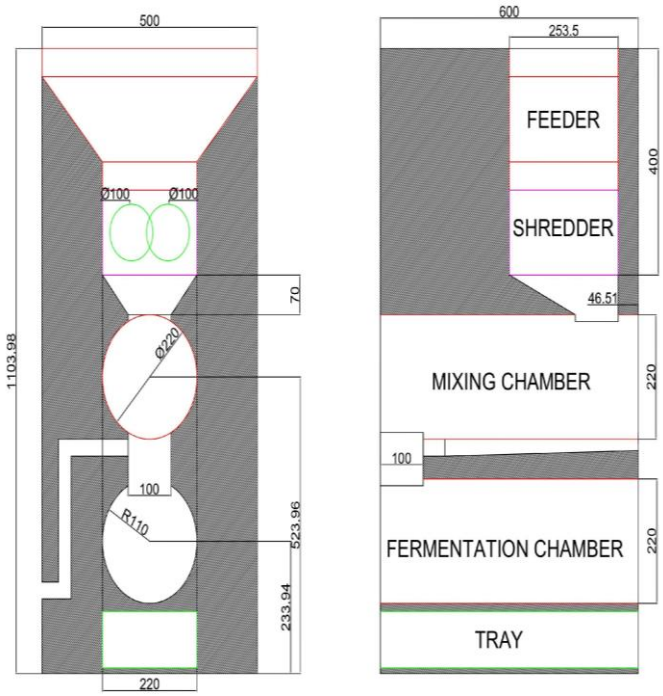

Fig 1. Design *(All dimensions are in mm)*

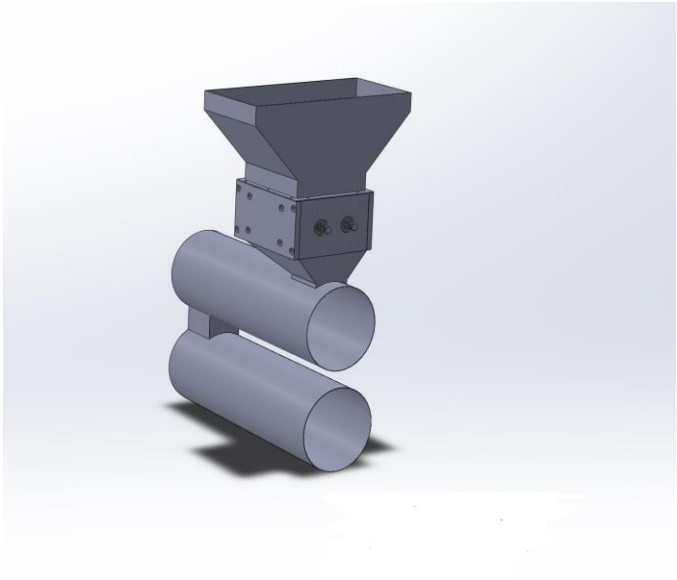

Fig 2. Concept 3D model

V. WORKING

Step 1: - Fill up with food scraps in the feeder, the shredding blades under the feeder take all of the sink waste. The food waste is crushed into smaller particles in the shredding system. The shredding process occurs only when the feeder cover is opened. And after closing the cover it will work for some time. When enough materials are shredded, the shredded waste materials flow to the mixing chamber.

Step 2: - The mixing chamber of this machine contains a single shaft double-helical blade and also a drainage filter system with slots of filter metallic sheets. These metallic filters separate the water content from the wastes, and also the rotating blades help to speed up the mixing of waste and heating coil gives a perfect combination of temperature, humidity, and aeration to wakes up the natural microorganisms inside the organic material and that accelerates the microorganism's metabolism. And then to works metabolism, this waste section moves to the Fermentation chamber with the help of the rotating blades.

Step 3: - The Fermentation chamber contains only a single shaft stirrer blade; this blade rotates continuously for about 12-48 hours (time may vary by the volume of waste). This process leads to full microorganisms and bacterial metabolism. This machine reduces composting time to just 48 hours. After this, the cylinder is opened and collected in the tray below the cylinder.

Step 4: - The tray can be removed from the unit and the ready-to-use fertilizer is collected and can be used for agricultural uses. After collecting, the tray can be washed and replaced in the unit. And a new cycle can be started.

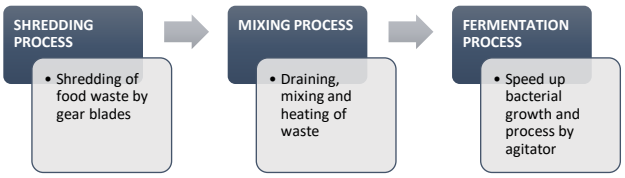

Fig 3. Diagrammatic representation of process

VI. ADVANTAGES

- Requires no human effort
- Requires less space
- Easy to handle
- Reduce organic waste pollution
- Easy to clean

VII. CONCLUTION

Here we are introducing an organic waste powdering unit. This unit helps to reduce environmental pollution due to food waste. Normally the fermentation process takes several months but, in this unit, we can fasten the fermentation process within 12 - 48 hours. Powdered fertilizer is the output and it can be used for kitchen gardening.

VIII. ACKNOWLEDGMENT

We are very grateful and would like to thank our guide Assistant prof. Mr. Fakrudheen Bava for his advice and continued support without which it would not have been possible to complete this report. We are also very grateful and also like to thank Head of the Department Prof. Fazludeen Chemmala and the entire Mechanical Engineering Department for helping in every possible manner during our course of study for this subject. Finally, we are thankful to all those who extended their help directly or indirectly in preparation for this report.

REFERENCES

[1]. Design of portable waste shredder machine for domestic compost, Rahul Thakur, Aman Sharma, Jyoti, R. P. Singh. volume-3, issue-9, september-2020. ISSN(online): 2581-5792 | RESAIM Publishing.
[2]. Transformation of biomass waste into sustainable organic fertilizers, Kit Wayne Chew, Shir Reen Chia, Hong-Wei Yen, Saifuddin Nomanbhay, Yeek-Chia Hoand Pau Loke Show. MDPI Published: 15 April 2019.
[3]. Conversion of food waste to fermentation products, Muhammad Waqas, Mohammad Rehan, Muhammad Daud Khan, and Abdul-Sattar Nizami. Chapter – January 2019.
[4]. Food waste to energy: an overview of sustainable approaches for food waste management and nutrient recycling, Kunwar Paritosh, Sandeep K. Kushwaha, Monika Yadav, Nidhi Pareek, Aakash Chawade, and Vivekanand. Hindawi, BioMed Research International, Volume 2017, Article ID 2370927, 19 pages.